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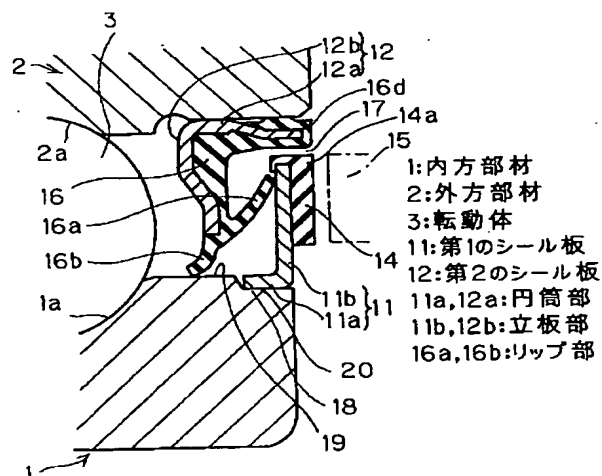
最終頁に続く

(54) 【発明の名称】 車輪用軸受

(57) 【要約】

【課題】 シール板の嵌合部から浸入する水の軸受内への流入が防止できて、軸受寿命の向上が図れ、シール板の抜けや移動の問題が生じず、かつ磁束密度の確保が容易なものとする。

【解決手段】 内方部材1と外方部材2の間にシール装置5を設ける。このシール装置5は、第1のシール板11にエンコーダ格子となる弾性部材14を設ける。第2のシール板12には、サイドリップ16aとラジアルリップ16bを一体に設ける。ラジアルリップ16bは、内方部材1のシール板嵌合部の近傍の外径面に摺接するものとする。内方部材1には段付部20を設け、第1のシール板11は、この段付部20に嵌合させる。



## 【特許請求の範囲】

【請求項1】 内方部材および外方部材と、これら内外の部材間に收容される複数の転動体と、上記内外の部材間の端部環状空間を密封するシール装置とからなる車輪用軸受において、

上記シール装置は、上記内方部材と外方部材のうちの互いに異なる部材に各々取付けられた第1および第2の環状のシール板を有し、両シール板は、各々円筒部と立板部とでなる断面L字状に形成されて互に対向し、第1のシール板は内方部材および外方部材のうちの回転側の部材に嵌合され、立板部は軸受外方側に配されると共に、この立板部に磁性体粉が混入された弾性部材が加硫接着されて、この弾性部材は周方向に交互に磁極が形成され、第2のシール板の円筒部と上記第1のシール板の立板部の先端とを僅かな径方向隙間をもって対峙させ、第2のシール板は上記立板部に摺接するサイドリップと、上記回転側部材のシール板嵌合部の近傍の外径面に摺接するラジアルリップとを一体に有するものとしたことを特徴とする車輪用軸受。

【請求項2】 上記内方部材および外方部材のうちの回転側の部材に第1のシール板の厚み相当の段差をもって小径となる段付部を設け、この段付部の外径面に第1のシール板の円筒部を圧入した請求項1に記載の車輪用軸受。

【請求項3】 上記第2のシール板のラジアルリップを軸受外側へ向かって傾斜させた請求項1または請求項2に記載の車輪用軸受。

【請求項4】 上記第2のシール板のサイドリップを、径方向の内外2か所に設けた請求項1ないし請求項3のいずれかに記載の車輪用軸受。

【請求項5】 上記第1のシール板が、フェライト系ステンレスにて形成されている請求項1ないし請求項4のいずれかに記載の車輪用軸受。

【請求項6】 上記第1のシール板の立板部の先端と上記第2のシール板の円筒部との少なくとも一方に、これらシール板に一体化された弾性部材の一部で形成される先端覆い部を設け、この先端覆い部を含む第1のシール板の立板部先端の最大径部が、第2のシール板の円筒部先端の最小径部よりも大径でかつ軸受内側に位置するものとした請求項1ないし請求項5のいずれかに記載の車輪用軸受。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】この発明は、自動車等における車輪用軸受に関し、特に回転検出用のエンコーダ格子を一体化した密封構造に関する。

## 【0002】

【従来の技術】従来、図11に示すように転動体103を介して転接する内方部材101および外方部材102間にシール装置105を設けた車輪用軸受において、シ

ール装置105にエンコーダ格子106を一体化させたものが提案されている（例えば、特開平6-281018号）。シール装置105は、各々断面L字状とされた第1、第2のシール板107、108を内方部材101および外方部材102にそれぞれ嵌合させ、第2のシール板108にリップ109を設けたものである。第1のシール板107は、スリングと呼ばれる。エンコーダ格子106は、磁性体粉が混入された弾性部材であり、第1のシール板107に加硫接着されている。エンコーダ格子106は、円周方向に交互に磁極が形成されたものであり、対面配置された磁気センサ110で検出される。

## 【0003】

【発明が解決しようとする課題】スリングとなるシール板107と回転輪となる内方部材101とは、圧入状態に嵌合しているが、その嵌合部111から微量の水が軸受内部へ浸入する恐れがある。このような水の浸入が生じると、シール板107、108に錆が発生し、また内部のグリースが劣化し、軸受寿命が低下する。そこで、シール板107の内方部材101との嵌合部111にゴム層を設けることを考えた。しかし、厚いゴム層を介在させると、嵌合力が不足し、シール板107の抜けや軸受内への移動が生じる恐れがある。上記嵌合部111にバックリングを介在させた場合も、抜けや移動の問題が発生する。弾性部材を介在させる代わりに、シール板107自体の材質を柔らかなものとして密着性を向上させることは可能であるが、そのような材質は非磁性体であるため、エンコーダ格子106の磁気コアとなる機能が得られず、磁束密度が不足する。

【0004】シール板107の防錆性については、一般的に使用されるSUS430等の耐食性の劣る磁性材に代えて、SUS304相当の耐食性を有する磁性ステンレス（SUS430MA、SUS430にニオブ、Ni等を添加して耐食性を向上させたもの）を使用することで対応でき、磁束密度についても、SUS430MAではSUS430と同様に得られる。しかし、材質が高価であるうえ、このような材質を用いても、水の浸入は防げず、グリースの劣化による軸受寿命の低下は防げない。

【0005】この発明の目的は、シール板の嵌合部から浸入する水の軸受内への流入が防止できて、軸受寿命の向上が図れ、またシール板の抜けや移動の問題が生じず、かつ磁束密度の確保が容易な車輪用軸受を提供することである。

## 【0006】

【課題を解決するための手段】この発明の車輪用軸受は、内方部材および外方部材と、これら内外の部材間に收容される複数の転動体と、上記内外の部材間の端部環状空間を密封するシール装置とからなる車輪用軸受において、上記シール装置は、上記内方部材と外方部材のう

ちの互いに異なる部材に各々取付けられた第1および第2の環状のシール板を有し、両シール板は、各々円筒部と立板部とでなる断面し字状に形成されて互に対向し、第1のシール板は内方部材および外方部材のうちの回転側の部材に嵌合され、立板部は軸受外方側に配されると共に、この立板部に磁性体粉が混入された弾性部材が加硫接着されて、この弾性部材は周方向に交互に磁極が形成され、第2のシール板の円筒部と上記第1のシール板の立板部の先端とを僅かな径方向隙間をもって対峙させ、第2のシール板は上記立板部に摺接するサイドリップと、上記回転側部材のシール板嵌合部の近傍の外径面に摺接するラジアルリップとを一体に有するものとしたことを特徴とする。この構成によると、第1のシール板の立板部に、磁性体粉の混入された弾性部材が加硫接着され、周方向に交互に磁極が形成されているため、この弾性部材でいわゆるエンコーダ格子が構成され、これに対面する磁気センサで回転検出を行うことができる。内外の部材間のシールについては、第2のシール板に設けられた各シールリップの摺接と、第2のシール板の円筒部に第1のシール板の立板部先端が僅かな径方向隙間で対峙することで構成されるラビリンズシールとで得られる。上記シールリップのうちのラジアルリップは、回転側部材のシール板嵌合部の近傍の外径面に摺接するため、第1のシール板と回転側部材との嵌合部から水が浸入しても、ラジアルリップの摺接部で軸受内への浸入が阻止される。そのため、浸入水でグリースが劣化することがなく、軸受寿命が向上する。また、このようにラジアルリップでシール性が確保されるため、第1のシール板の材質が制限されず、適宜の磁性体を用いることで、その立板部に設けられた弾性部材によるエンコーダ格子の磁束密度を高めることができる。

【0007】この発明において、上記内方部材および外方部材のうちの回転側の部材に、第1のシール板の厚み相当の段差をもって小径となる段付部を設け、この段付部の外径面に第1のシール板の円筒部を圧入しても良い。このように、段付部を設けて第1のシール板を嵌合させることにより、第1のシール板の軸受内方への移動を防止することができ、第1のシール板の軸方向の設置位置が規制されて、サイドリップの適切な締代が維持される。上記段付部は、シール板の円筒部の厚み相当の深さであるため、段付部の形成に伴う回転側部材の強度劣化や、第1のシール板の大型化の問題がなく、また段付部が浅くて係合不十分となることも避けられる。

【0008】この発明の上記各構成の場合に、上記第2のシール板のラジアルリップを軸受外側へ向かって傾斜させても良い。ラジアルリップを軸受外側へ向かって傾斜させた場合、逆向きの傾斜の場合に比べて、軸受外部からの水や塵埃の侵入防止作用が高められる。

【0009】この発明の上記各構成の場合に、上記第2のシール板のサイドリップを、径方向の内外2か所に設

けても良い。サイドリップは、主に軸受外から軸受内への水の浸入防止機能を奏するものであり、このサイドリップを内外2か所に設けることで、軸受内への水の浸入防止機能が高められる。

【0010】この発明の上記各構成の場合に、上記第1のシール板を、フェライト系ステンレスで形成されたものとしても良い。フェライト系ステンレスは、強磁性体であり、これを第1のシール板に用いることで、エンコーダ格子となる弾性部材の磁束密度を高めることができる。

【0011】この発明の上記各構成の場合に、上記第1のシール板の立板部の先端と上記第2のシール板の円筒部との少なくとも一方に、これらシール板に一体化された弾性部材の一部で形成される先端覆い部を設け、この先端覆い部を含む第1のシール板の立板部先端の最大径部が、第2のシール板の円筒部先端の最小径部よりも大径でかつ軸受内側に位置するものとしても良い。この発明の基本構成では、第2のシール板のラジアルリップが第1のシール板の円筒部に摺接していないため、そのままでは軸受への未組み込み状態で、第1、第2のシール板が相互に分離する。そのため、搬送時や軸受への組立作業が煩雑になり、工数が増える。これに対して、この請求項の発明では、上記のように先端覆い部を設け、第1のシール板の立板部先端の最大径部が、第2のシール板の円筒部先端の最小径部よりも大径でかつ軸受内側に位置するものとしたため、未組立状態において、第1のシール板と第2のシール板とが分離することが防止され、一つの部品として取り扱うことができる。第1、第2のシール板は、弾性部材の先端覆い部で相互に抜け止め状態に係合させるので、相互に組み込み状態として、分解したりすることが、先端覆い部の弾性変形で可能になる。また、このような先端覆い部を設けることにより、ラビリンズシールを構成する隙間の断面形状が蛇行状となり、シール効果も向上する。

【0012】

【発明の実施の形態】この発明の実施形態を図面と共に説明する。図1に示すように、この車輪用軸受は、内方部材1および外方部材2と、これら内外の部材1、2間に収容される複数の転動体3と、内外の部材間の端部環状空間を密封するシール装置5とからなる。内方部材1および外方部材2は、転動体3の軌道面1a、2aを有しており、各軌道面1a、2aは溝状に形成されている。内方部材1および外方部材2は、各々転動体3を介して互いに回転自在となった内周側の部材および外周側の部材のことであり、軸受内輪および軸受外輪の単独であっても、これら軸受内輪や軸受外輪と別の部品とが組合わさった組立部材であっても良い。また、内方部材1は、軸であっても良い。転動体3は、ボールまたはころからなり、この例ではボールが用いられている。

【0013】図3は、車輪用軸受の全体構成の一例を示

す。この車輪用軸受は複列の転がり軸受、詳しくは複列のアンギュラ玉軸受とされており、その軸受内輪は、ハブ輪6と、このハブ輪6の端部外径に嵌合した別体内輪1Aとで構成される。これらハブ輪6および別体内輪1Aに各転動体列の軌道面が形成されている。上記の別体内輪1Aが、図1の例における内方部材1となる。ハブ輪6には、等速自在継手7の一端（例えば外輪）が連結され、ハブ輪6のハブ部6aに車輪（図示せず）がボルト8で取付けられる。等速自在継手7は、その他端（例えば内輪）が駆動軸に連結される。外方部材2は、フランジ2bを有する軸受外輪からなり、ナックル等からなるハウジング10に取付けられる。外方部材2は、両転動体列の軌道面を有するものとされている。転動体3は各列毎に保持器4で保持されている。内方部材1と外方部材2の間の環状空間は、一端、つまり車輪中央側の端部が上記のシール装置5で密封されている。外方部材2とハブ輪6との間の環状空間の端部は、別のシール装置13で密封されている。

【0014】シール装置5は、図1、図2に示すように、内方部材1と外方部材2に各々取付けられた第1および第2の環状のシール板11、12を有する。これらシール板11、12は、各々内方部材1および外方部材2に圧入状態に嵌合させることで取付けられている。両シール板11、12は、各々円筒部11a、12aと立板部11b、12bとでなる断面L字状に形成されて互いに対向する。第1のシール板11は、内方部材1および外方部材2のうちの回転側の部材である内方部材1に嵌合され、スリングとなる。第1のシール板11は、円筒部11aが、内方部材1の外径面に形成された段付部20の外径面に嵌合している。段付部20は、第1のシール板11の厚み相当の段差をもって小径となる部分であり、その軸方向幅は、第1のシール板11の円筒部11aの先端が段付部20の側壁面に係合する幅に設けられている。例えば、段付部20の軸方向幅は、円筒部11aと略等しい幅とされている。

【0015】第1のシール板11の立板部11bは、軸受外方側に配され、磁性体粉が混入された弾性部材14が加硫接着されている。この弾性部材14は、エンコーダ格子となるものであり、周方向に交互に磁極N、S（図2）が形成され、いわゆるゴム磁石とされている。磁極N、Sは、ピッチ円PCDにおいて、所定のピッチpとなるように形成されている。このエンコーダ格子となる弾性部材14に対面して、図1のように磁気センサ15を配置することで、車輪回転速度の検出用のロータリエンコーダが構成される。

【0016】第2のシール板12は、第1のシール板11の立板部11bに摺接するサイドリップ16aと、内方部材1のシール板嵌合部18の近傍の外径面19に摺接するラジアルリップ16bとを一体に有する。これらリップ16a、16bは、第2のシール板12に加硫接

着されたエラストマからなる弾性部材16の一部として設けられている。サイドリップ16aは、先端が立板部11bの先端側へ延びるように傾斜しており、ラジアルリップ16bは、先端が軸受内方へ延びるように傾斜している。第2のシール板12の立板部12bは、先端部よりも基端部が軸受内側へ位置するようにS字ないしZ字状に屈曲しており、これによりシール板12の剛性が高められると共に、弾性部材16の厚肉化が容易とされている。

【0017】第2のシール板12の円筒部12aと第1のシール板11の立板部11bの先端とは僅かな径方向隙間をもって対峙させ、その隙間でラビリンスシール17を構成している。第1のシール板11の立板部11bの先面、および第2のシール板12の円筒部の先端は、各々弾性部材14、16の一部となる先端覆い部14a、16dで覆われており、上記ラビリンスシール17は、具体的には、これら先端覆い部14a、16d間の隙間で形成される。なお、これら先端覆い部14a、16dは、両方とも省略しても良く、またいずれか片方のみを省略しても良い。

【0018】第1のシール板11は、強磁性体等の磁性体の鋼板、例えばフェライト系のステンレス鋼板（JIS規格のSUS430系等）や、防錆処理された圧延鋼板等が用いられる。第2のシール板12は、鋼板、例えば非磁性体であるオーステナイト系のステンレス鋼板（SUS304系等）や、防錆処理された圧延鋼板等が用いられる。例えば、第1のシール板11をフェライト系のステンレス鋼板とし、第2のシール板12をオーステナイト系のステンレス鋼板としても良い。

【0019】この構成の車輪用軸受によると、内外の部材1、2間のシールについては、第2のシール板12に設けられた各シールリップ16a、16bの摺接と、第2のシール板12の円筒部12aに第1のシール板11の立板部11bの先端が僅かな径方向隙間で対峙することで構成されるラビリンスシール17とで得られる。ラジアルリップ16bは、回転側部材である内方部材1のシール板嵌合部の近傍の外径面に摺接するため、第1のシール板11と内方部材1との嵌合部18から水が浸入しても、ラジアルリップ16bの摺接部で軸受内への浸入が阻止される。そのため、浸入水でグリースが劣化することがなく、軸受寿命が向上する。また、このようにラジアルリップ16bでシール性が確保されるため、第1のシール板11の材質が制限されず、適宜の強磁性体を用いることで、その立板部11bに設けられた弾性部材14によるエンコーダ格子の磁束密度を高めることができる。また、内方部材1に段付部20を設けて第1のシール板11を嵌合させたため、第1のシール板11の軸受内方への移動を防止することができ、第1のシール板11の軸方向の設置位置が規制されて、サイドリップ16aの適切な締代が維持される。上記段付部20は、

シール板 11 の円筒部 11 a の厚み相当の深さであるため、段付部 11 の形成に伴う内方部材 1 の強度劣化や、第 1 のシール板 11 の大型化の問題がなく、また段付部 11 が浅くて係合不十分となることも避けられる。

【0020】図 4 は、この発明の他の実施形態を示す。この実施形態は、図 1 に示した実施形態において、ラジアルリップ 16 b を、その先端が軸受内側へ延びるように傾斜させた構成に代えて、このラジアルリップ 16 b を、その先端が軸受外側へ延びるように傾斜させたものである。その他の事項は図 1 の実施形態と同じである。このように、ラジアルリップ 16 b を、その先端が軸受外側へ延びるように傾斜させた場合、軸受外から軸受内への水の浸入防止効果が高くなる。そのため、軸受外からサイドリップ 16 a や嵌合部 18 を介して浸入した水が、ラジアルリップ 16 b を超えて軸受内に浸入することに対して、確実に防止される。

【0021】図 5 は、この発明のさらに他の実施形態を示す。この実施形態は、図 4 に示した実施形態において、サイドリップ 16 a を、径方向の内外に離れた 2 か所に設けたものである。その他の事項は図 4 の実施形態と同じである。サイドリップ 16 a は、主に軸受外から軸受内への水の浸入防止機能を奏するものであり、このサイドリップ 16 a を内外 2 か所に設けることで、軸受内への水の浸入防止機能が高められる。

【0022】図 6 は、この発明のさらに他の実施形態を示す。この実施形態は、図 5 の実施形態において、第 1 のシール板 11 の先端覆い部 14 a の外径面に、軸受内側部分で環状の外周突条 14 a a を形成し、かつ第 2 のシール板 11 の先端覆い部 16 d の内径面に環状の内周突条 16 d a を形成したものである。これら外周突条 14 a a および内周突条 16 d a は、第 1 のシール板 11 の立板部先端の最大径部および第 2 のシール板 12 の円筒部先端の最小径部を構成する。外周突条 14 a a は、内周突条 16 d a よりも軸受内側に位置し、かつその外径が内周突条 16 d a の内径よりも大きく形成されている。外周突条 14 a a および内周突条 16 d a の対向面は傾斜面とされている。その他の事項は図 6 の実施形態と同じである。

【0023】この構成の場合、外周突条 14 a a と内周突条 16 d a とが軸方向に係合することで、第 1 のシール板 11 と第 2 のシール板 12 の軸受への未組立時における分離が防止される。すなわち、基本構成では、第 2 のシール板 12 のラジアルリップ 16 b が第 1 のシール板 11 の円筒部 11 a に摺接していないため、そのままでは軸受への未組み込み状態で、第 1、第 2 のシール板 11、12 が相互に分離される。そのため、搬送時や軸受への組立作業が煩雑になり、工数が増える。これに対して、上記のように外周突条 14 a a と内周突条 16 d a とを、軸方向に係合するように設けることで、未組立状態において、第 1 のシール板 11 と第 2 のシール板 1

2 とが分離されることが防止され、一つの部品として取り扱うことができる。そのため、搬送時は勿論のこと、軸受への組立工数が削減でき、組立等が簡単になる。また、このような外周突条 14 a a および内周突条 16 d a を設けることにより、ラビリンスシール 17 を構成する隙間の断面形状が蛇行状となり、シール効果も向上する。外周突条 14 a a および内周突条 16 d a は、各々弾性部材 14、16 の一部で形成されるため、第 1、第 2 のシール板 11、12 を軸方向に相互に強く移動させることで、強制時に分離したり組み込んだりすることが可能である。

【0024】なお、図 6 の実施形態では、第 1、第 2 のシール板 11、12 の両方に先端覆い部 14 a、16 d を設け、これらに外周突条 14 a a および内周突条 16 d a を設けたが、これら先端覆い部 14 a、16 d はいずれか片方のみを設けるようにしても良い。例えば、図 7 に示すように、第 2 のシール板 12 の円筒部 12 a の先端部 12 a a は、露出状態として先端側が内径側に位置するように屈曲されたものとし、これに軸方向に係合可能な外周突条 14 a a を第 1 のシール板 11 の先端覆い部 14 a に形成したものであっても良い。この構成の場合、未組立状態における第 1、第 2 のシール板 11、12 の分離が防止される。また、これとは逆に、第 1 のシール板 11 の立板部先端を露出状態とし、第 2 のシール板 12 の円筒部 12 a の先端覆い部 16 d に、その露出状態の立板部 11 b の先端に係合する内周突条 16 d a (図 6) を設けても良い。

【0025】図 8 は、この発明のさらに他の実施形態を示す。この実施形態は、図 1 に示した実施形態において、弾性部材 16 に設けられるラジアルリップ 16 b として、その先端が軸受内側へ延びるように傾斜したラジアルリップ 16 b<sub>1</sub> に加えて、先端が軸受外側へ延びるように傾斜したラジアルリップ 16 b<sub>2</sub> を設けたものである。このように、先端が軸受外側へ延びるラジアルリップ 16 b<sub>2</sub> を設けた場合、軸受外から軸受内への水の浸入防止効果が高くなる。先端が軸受内側へ延びるラジアルリップ 16 b<sub>1</sub> は、軸受外へのグリース漏れの防止機能を果たす。その他の事項は、図 1 の実施形態と同じである。

【0026】図 9 は、この発明のさらに他の実施形態を示す。この実施形態は、図 8 に示した実施形態において、内方部材 1 の軌道面 1 a と幅面との間の外径面 1 b を平坦な円筒面としたものである。すなわち、図 8 の例における段付部 20 を無くしたものである。内方部材 1 は内輪からなる。その他の構成は図 8 の実施形態と同じである。このように、内方部材 1 の外径面 1 b を、段付部のない平坦面とした場合、シール装置 5 の全体の断面は、図 8 の例に比べて小さくなるが、グリースリップとなる軸受内側へ延びるラジアルリップ 16 b<sub>1</sub> の摺接スペースを大きくとれる。そのため、軸受内に設ける軸方

向のスペースをコンパクト化でき、設計の自由度が増す。軸方向のスペースを同じとすると、軸受スパンを広くできるため、剛性を高くすることができる。なお、図1、図4～図7の各実施形態においても、図9の例と同様に、内方部材1の軌道面1aと幅面との間の外径面を平坦な円筒面としても良い。すなわち、段付部20を無くして全体を外径面19と同径の円筒面としても良い。

【0027】図9の例を除く上記各実施形態（内方部材1の外径面に段付部20を形成した各実施形態）では、図10に示すように内輪となる内方部材1の各部を一体の砥石30により同時研削する。すなわち、内方部材1の小径端面1c、カウンタボア部1d、軌道面1a、外径面19、段付部20を、一体の砥石30により同時研削する。砥石30は、同図に矢印で示すように斜め方向に押し付け、アンギュラカットを行う。このように同時研削するのは、内方部材1の各部の同軸度を向上させると共に、小径端面1cと軌道面1aとのピッチ寸法Pを精度良く加工するためである。このピッチ寸法Pは、軸受隙間に関係する。

【0028】

【発明の効果】この発明の車輪用軸受は、第2のシール板が、第1のシール板の立板部に摺接するサイドリップと、回転側部材のシール板嵌合部の近傍の外径面に摺接するラジアルリップとを一体に有するものとしたため、シール板の嵌合部から浸入する水の軸受内への流入が防止できて、軸受寿命の向上が図れ、またシール板の抜けや移動の問題が生じず、かつ磁束密度の確保が容易となる。

【図面の簡単な説明】

【図1】この発明の一実施形態にかかる車輪用軸受の部分断面図である。

【図2】そのエンコーダ格子となる弾性部材の部分正面図である。

10

\*【図3】同車輪用軸受の全体例の断面図である。

【図4】この発明の他の実施形態にかかる車輪用軸受の部分断面図である。

【図5】この発明のさらに他の実施形態にかかる車輪用軸受の部分断面図である。

【図6】この発明のさらに他の実施形態にかかる車輪用軸受の部分断面図である。

【図7】この発明のさらに他の実施形態にかかる車輪用軸受の部分断面図である。

【図8】この発明のさらに他の実施形態にかかる車輪用軸受の部分断面図である。

【図9】この発明のさらに他の実施形態にかかる車輪用軸受の部分断面図である。

【図10】内輪加工方法例の説明図である。

【図11】従来例の断面図である。

【符号の説明】

1…内方部材

2…外方部材

3…転動体

20 5…シール装置

6…ハブ輪

11…第1のシール板

12…第2のシール板

11a, 12a…円筒部

11b, 12b…立板部

14…弾性部材

14d…先端覆い部

16a, 16b…リップ部

16d…先端覆い部

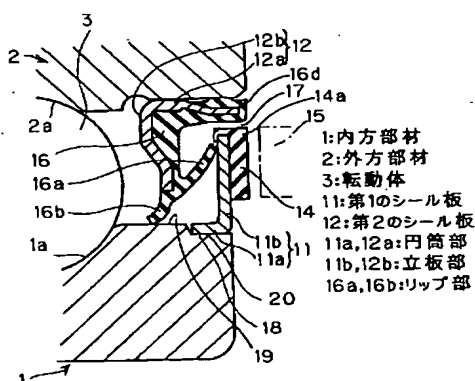
30 18…嵌合部

20…段付部

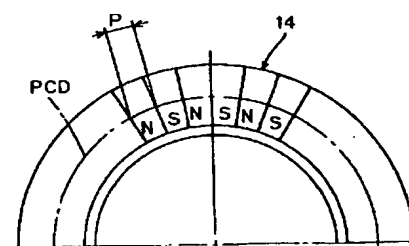
N, S…磁極

\*

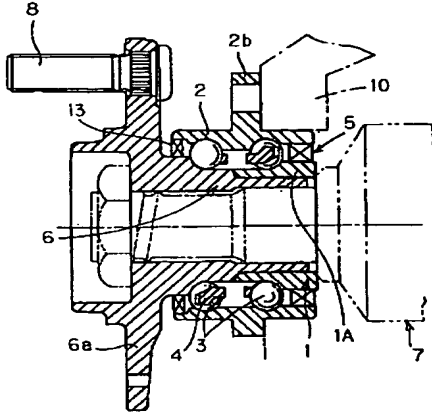
【図1】



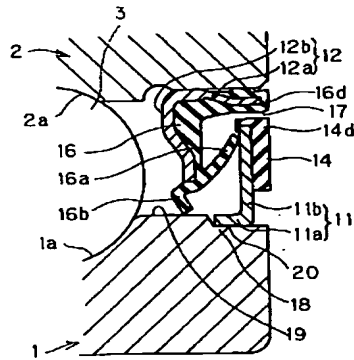
【図2】



【図3】

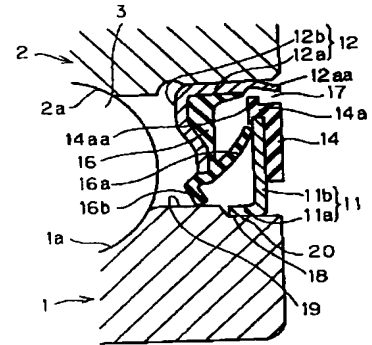
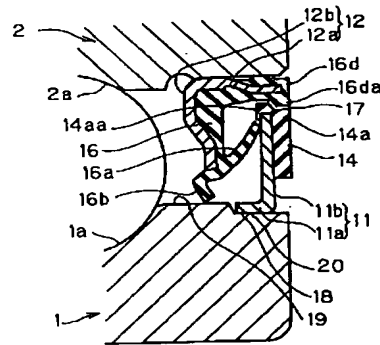


【図4】

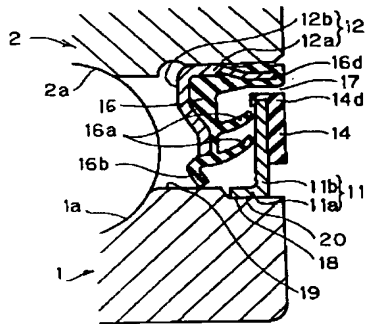


【図6】

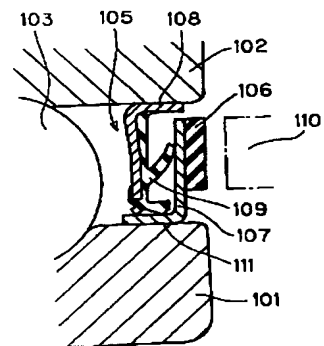
【図7】



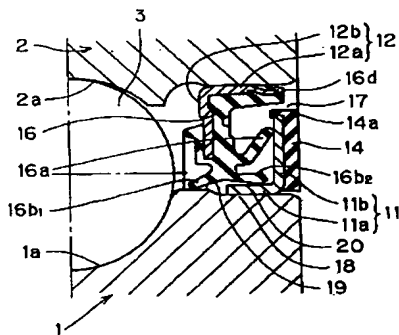
【図5】



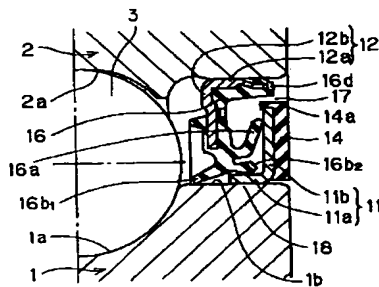
【図11】



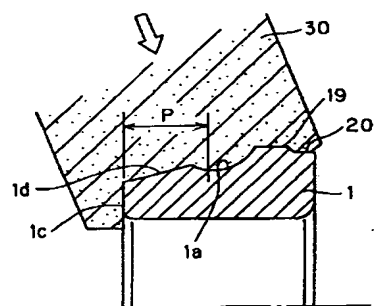
【図8】



【図9】



【図10】



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フロントページの続き

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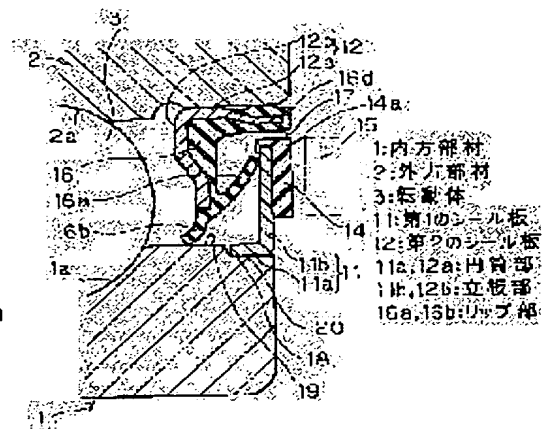
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## (54) BEARING FOR AXLE

(57)Abstract:

**PROBLEM TO BE SOLVED:** To prevent the inflow of the water intruded from an engagement part of a seal plate into a bearing, improve the life of the bearing, prevent a problem such as the slipping-off and the movement of the seal plate, and easily ensure the magnetic flux density.

**SOLUTION:** A sealing device 5 is mounted between an inner member 1 and an outer member 21. This sealing device 5 is provided with an elastic member 14 acting as an encoder lattice on a first seal plate 11. A side lip 16a and a radial lip 16b are integrally mounted on a second seal plate 12. The radial lip 16b is slidably contacted with an outer surface near a seal plate engagement part, of the inner member 1. The inner member 1 has a stepped part 20, and the first seal plate 11 is fitted to the stepped part 20.



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CLAIMS

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[Claim(s)]

[Claim 1] In the bearing for wheels which consists of two or more rolling elements held between an inner direction member and the method member of outside, and the member of these inside and outside, and a sealing device which seals the edge annular space between the above-mentioned internal and external members The above-mentioned sealing device has the 1st and 2nd annular seal plates respectively attached in a mutually different member of the method member of the inside of the above, and the method members of outside. A double-seal plate While being formed in the shape of [ which becomes in a body and the standing board section respectively ] a cross section of L characters, countering mutually, carrying out fitting of the 1st seal plate to the member by the side of rotation of an inner direction member and the method members of outside and allotting the standing board section to the method side of the outside of bearing Vulcanization adhesion of the elastic member by which magnetic-substance powder was mixed in this standing board section is carried out, and, as for this elastic member, a magnetic pole is formed in a hoop direction by turns. The side lip to which the body of the 2nd seal plate and the tip of the standing board section of the seal plate of the above 1st are confronted with few direction clearances of a path, and the 2nd seal plate \*\*\*\*s in the above-mentioned standing board section, Bearing for wheels characterized by having in one the radial lip which \*\*\*\*s to the outer-diameter side near the seal plate fitting section of the above-mentioned rotation flank material.

[Claim 2] Bearing for wheels according to claim 1 which prepared the joggle which becomes a member by the side of rotation of the method member of the inside of the above, and the method members of outside with a minor diameter with the level difference of thickness of the 1st seal plate, and pressed the body of the 1st seal plate fit in the outer-diameter side of this joggle.

[Claim 3] Bearing for wheels according to claim 1 or 2 which made the radial lip of the seal plate of the above 2nd incline toward a bearing outside.

[Claim 4] Bearing for wheels according to claim 1 to 3 which prepared the side lip of the seal plate of the above 2nd within and without [ two ] the direction of a path.

[Claim 5] Bearing for wheels according to claim 1 to 4 in which the seal plate of the above 1st is formed by ferrite system stainless steel.

[Claim 6] At least to one side of the tip of the standing board section of the seal plate of the above 1st, and the body of the seal plate of the above 2nd The tip cover section formed by a part of elastic member united with these seal plate is prepared. Bearing for wheels according to claim 1 to 5 to which the overall diameter section at the tip of the standing board section of the 1st seal plate containing this tip cover section shall be a major diameter, and shall be located in the bearing inside rather than the minimum diameter at the tip of a body of the 2nd seal plate.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the seal structure which unified the encoder grid for rotation detection especially about the bearing for wheels in an automobile etc.

[0002]

[Description of the Prior Art] In the bearing for wheels which formed the sealing device 105 between the way member 101 and the method member 102 of outside while \*\*\*\*(ing) through the rolling element 103, as conventionally shown in drawing 11, the thing which made the encoder grid 106 unite with a sealing device 105 is proposed (for example, JP,6-281018,A). A sealing device 105 carries out fitting of the 1st and 2nd seal plate 107,108 respectively made into the shape of a cross section of L characters to the inner direction member 101 and the method member 102 of outside, respectively, and forms a lip 109 in the 2nd seal plate 108. The 1st seal plate 107 is called a slinger. The encoder grid 106 is the elastic member in which magnetic-substance powder was mixed, and vulcanization adhesion is carried out at the 1st seal plate 107. A magnetic pole is formed in a circumferencial direction by turns, and the encoder grid 106 is detected by the magnetometric sensor 110 by which confrontation arrangement was carried out.

[0003]

[Problem(s) to be Solved by the Invention] While becoming the seal plate 107 used as a slinger, and a turning wheel, although the way member 101 has fitted into a press fit condition, it has a possibility that the water of a minute amount may infiltrate into the interior of bearing from the fitting section 111. If permeation of such water arises, rust will be generated to the seal plate 107,108, and internal grease will deteriorate, and a bearing life will fall. Then, it considered preparing a rubber layer in the fitting section 111 with the way member 101 among the seal plates 107. However, when a thick rubber layer is made to intervene, the fitting force is insufficient and there is a possibility that the omission of the seal plate 107 and migration into bearing may arise. Also when packing is made to be placed between the above-mentioned fitting sections 111, an omission and the problem of migration occur. Instead of making an elastic member intervene, although it is possible for the quality of the material of seal plate 107 the very thing to raise adhesion as a soft thing, since such the quality of the material is non-magnetic material, the function used as the magnetic core of the encoder grid 106 is not obtained, but it runs short of flux density.

[0004] It can respond by using the magnetic stainless steel (SUS430 thing which added niobium, nickel, etc. to MA and SUS430, and raised corrosion resistance) which replaces with the magnetic material in which the corrosion resistance of the SUS430 grade generally used is inferior, and has corrosion resistance equivalent to SUS304 about the rust-proofing nature of the seal plate 107, and is obtained by SUS430MA about flux density as well as SUS430. However, the top where the quality of the material is expensive, even if it uses such the quality of the material, permeation of water cannot be prevented and the fall of the bearing life by degradation of grease cannot be prevented.

[0005] The purpose of this invention is that can prevent an inflow into the bearing of the water

which permeates from the fitting section of a seal plate, and can aim at improvement in a bearing life, and neither the omission of a seal plate nor the problem of migration arises, and reservation of flux density offers the easy bearing for wheels.  
[0006]

[Means for Solving the Problem] In the bearing for wheels which the bearing for wheels of this invention turns into from two or more rolling elements held between an inner direction member and the method member of outside, and the member of these inside and outside, and the sealing device which seals the edge annular space between the above-mentioned internal and external members The above-mentioned sealing device has the 1st and 2nd annular seal plates respectively attached in a mutually different member of the method member of the inside of the above, and the method members of outside. A double-seal plate While being formed in the shape of [ which becomes in a body and the standing board section respectively ] a cross section of L characters, countering mutually, carrying out fitting of the 1st seal plate to the member by the side of rotation of an inner direction member and the method members of outside and allotting the standing board section to the method side of the outside of bearing Vulcanization adhesion of the elastic member by which magnetic-substance powder was mixed in this standing board section is carried out, and, as for this elastic member, a magnetic pole is formed in a hoop direction by turns. The side lip to which the body of the 2nd seal plate and the tip of the standing board section of the seal plate of the above 1st are confronted with few direction clearances of a path, and the 2nd seal plate \*\*\*\*\* in the above-mentioned standing board section, It is characterized by having in one the radial lip which \*\*\*\*\* to the outer-diameter side near the seal plate fitting section of the above-mentioned rotation flank material. Since according to this configuration vulcanization adhesion of the elastic member by which magnetic-substance powder was mixed in the standing board section of the 1st seal plate is carried out and the magnetic pole is formed in the hoop direction by turns, the so-called encoder grid consists of this elastic member, and the magnetometric sensor which meets this can perform rotation detection. About the seal between internal and external members, it is obtained by the slide contact of each seal lip prepared in the 2nd seal plate, and the labyrinth seal which consists of standing face to face against the body of the 2nd seal plate in few [ the standing board section tip of the 1st seal plate ] direction clearances of a path. Since the radial lip of the above-mentioned seal lips \*\*\*\*\* to the outer-diameter side near the seal plate fitting section of rotation flank material, even if water permeates from the fitting section of the 1st seal plate and rotation flank material, permeation into bearing is prevented in the slide contact section of a radial lip. Therefore, grease does not deteriorate in infiltration inflow and a bearing life improves. Moreover, since seal nature is secured with a radial lip in this way, the quality of the material of the 1st seal plate is not restricted, but the flux density of the encoder grid by the elastic member prepared in the standing board section can be raised by using the proper magnetic substance.

[0007] In this invention, the joggle which has the level difference of thickness of the 1st seal plate in the member by the side of rotation of the method member of the inside of the above and the method members of outside, and serves as a minor diameter may be prepared, and the body of the 1st seal plate may be pressed fit in the outer-diameter side of this joggle. Thus, by preparing joggle and carrying out fitting of the 1st seal plate, migration to the method of the inside of bearing of the 1st seal plate can be prevented, the installation location of the shaft orientations of the 1st seal plate is regulated, and interference with a suitable side lip is maintained. It is also avoided that there is no problem of degradation of the rotation flank material accompanying formation of joggle on the strength and enlargement of the 1st seal plate, and it becomes it is shallow and inadequate engaging joggle since the above-mentioned joggle is the depth of thickness of the body of a seal plate.

[0008] The radial lip of the seal plate of the above 2nd may be made to incline toward a bearing outside in each above-mentioned configuration of this invention. When a radial lip is made to incline toward a bearing outside, compared with the case of the inclination of the reverse sense, an invasion prevention operation of the water from the bearing outside and dust is raised.

[0009] In each above-mentioned configuration of this invention, the side lip of the seal plate of

the above 2nd may be prepared within and without [ two ] the direction of a path. A side lip mainly does so the permeation prevention function of the water from the outside of bearing to into bearing, it is preparing this side lip within and without two, and the permeation prevention function of the water into bearing is raised.

[0010] In each above-mentioned configuration of this invention, it is good also as what was formed by ferrite system stainless steel in the seal plate of the above 1st. Ferrite system stainless steel is a ferromagnetic and can raise the flux density of the elastic member used as an encoder grid by using this for the 1st seal plate.

[0011] In each above-mentioned configuration of this invention, at least to one side of the tip of the standing board section of the seal plate of the above 1st, and the body of the seal plate of the above 2nd It is good also as that to which the overall diameter section at the tip of the standing board section of the 1st seal plate which prepares the tip cover section formed by a part of elastic member united with these seal plate, and contains this tip cover section is a major diameter, and is located in the bearing inside rather than the minimum diameter at the tip of a body of the 2nd seal plate. With the basic configuration of this invention, since the radial lip of the 2nd seal plate is not in slide contact with the body of the 1st seal plate, if it remains as it is, it is in the non-inclusion condition to bearing, and the 1st and 2nd seal plate dissociates mutually. Therefore, the assembly operation to the time of conveyance or bearing becomes complicated, and a man day increases. On the other hand, in invention of this claim, prepare the tip cover section as mentioned above, and it writes as that to which the overall diameter section at the tip of the standing board section of the 1st seal plate is a major diameter, and is located in the bearing inside rather than the minimum diameter at the tip of a body of the 2nd seal plate. In a non-assembly condition, it is prevented that the 1st seal plate and the 2nd seal plate dissociate, and it can deal with it as one component. Since it escapes from the 1st and 2nd seal plate mutually in the tip cover section of an elastic member and is made to engage with a stop condition, it becomes possible by the elastic deformation of the tip cover section to incorporate mutually, to consider as a condition or to decompose. Moreover, by preparing such the tip cover section, the cross-section configuration of the clearance which constitutes a labyrinth seal turns into a letter of meandering, and seal effectiveness's improves.

[0012]

[Embodiment of the Invention] The operation gestalt of this invention is explained with a drawing. As shown in drawing 1 , this bearing for wheels consists of the inner direction member 1 and the method member 2 of outside, the member 1 of these inside and outside, two or more rolling elements 3 held among two, and a sealing device 5 which seals the edge annular space between internal and external members. The inner direction member 1 and the method member 2 of outside have the orbital planes 1a and 2a of a rolling element 3, and each orbital planes 1a and 2a are formed in the groove. The inner direction member 1 and the method member 2 of outside may be a member by the side of the inner circumference whose rotation was respectively attained mutually through the rolling element 3, and a member by the side of a periphery, a bearing inner ring of spiral wound gasket and a bearing outer ring of spiral wound gasket may be independent, or components different from these bearing inner ring of spiral wound gasket or a bearing outer ring of spiral wound gasket may be union \*\*\*\*\* built up members. Moreover, the inner direction member 1 may be a shaft. A rolling element 3 consists of a ball or time, and the ball is used in this example.

[0013] Drawing 3 shows an example of the whole configuration of the bearing for wheels. This bearing for wheels consists of anti-friction bearing of a double row, and inner-ring-of-spiral-wound-gasket 1 of another object with which it considers as angular contact ball bearing of double row in detail, and that bearing inner ring of spiral wound gasket fitted into diameter of edge outside of hub ring 6 and this hub ring 6 A. The orbital plane of each rolling-element train is formed in these hub ring 6 and another inside-of-the-body ring 1A. The above-mentioned another inside-of-the-body ring 1A becomes the method member 1 of inside in the example of drawing 1 . The end (for example, outer ring of spiral wound gasket) of the uniform universal joint 7 is connected with the hub ring 6, and a wheel (not shown) is attached in hub section 6a of the hub ring 6 with a bolt 8. As for the uniform universal joint 7, the other end (for example, inner

ring of spiral wound gasket 10 is connected with a driving shaft. The method member 2 of outside is attached in the housing 10 which consists of a bearing outer ring of spiral wound gasket which has flange 2b, and consists of a knuckle etc. The method member 2 of outside shall have the orbital plane of both the rolling-elements train. The rolling element 3 is held with the cage 4 for every train. The annular space between the inner direction member 1 and the method member 2 of outside is sealed with the sealing device 5 of the above [ the edge of an end, i.e., an axle central site, ]. The edge of the annular space between the method member 2 of outside and the hub ring 6 is sealed with another sealing device 13.

[0014] A sealing device 5 has the 1st and 2nd annular seal plates 11 and 12 respectively attached in the inner direction member 1 and the method member 2 of outside, as shown in drawing 1 and drawing 2 . These seal plates 11 and 12 are attached by making fitting change into a press fit condition to the method member 1 of inside, and the method member 2 of outside respectively. The double-seal plates 11 and 12 are formed in the shape of [ which becomes respectively in Bodies 11a and 12a and the standing board sections 11b and 12b ] a cross section of L characters, and counter mutually. While it is a member by the side of rotation of the inner direction member 1 and the method members 2 of outside, fitting of the 1st seal plate 11 is carried out to the way member 1, and it serves as a slinger. The 1st seal plate 11 has fitted into the outer-diameter side of joggle 20 where body 11a was formed in the outer-diameter side of the inner direction member 1. It is the part which joggle 20 has the level difference of thickness of the 1st seal plate 11, and serves as a minor diameter, and the shaft-orientations width of face is prepared in the width of face to which the tip of body 11a of the 1st seal plate 11 engages with the side-attachment-wall side of joggle 20. for example, the shaft-orientations width of face of joggle 20 -- body 11a and abbreviation -- it considers as equal width of face.

[0015] Standing board section 11b of the 1st seal plate 11 is allotted to the method side of the outside of bearing, and vulcanization adhesion of the elastic member 14 in which magnetic-substance powder was mixed is carried out. It becomes an encoder grid, and magnetic poles N and S ( drawing 2 ) are formed in a hoop direction by turns, and let this elastic member 14 be the so-called flexible magnet. In the pitch circle PCD, magnetic poles N and S are formed so that it may become the predetermined pitch p. The rotary encoder for detection of wheel rotational speed consists of meeting the elastic member 14 used as this encoder grid, and arranging a magnetometric sensor 15 like drawing 1 .

[0016] The 2nd seal plate 12 has in one side lip 16a which \*\*\*\*\* to standing board section 11b of the 1st seal plate 11, and radial lip 16b which \*\*\*\*\* to the outer-diameter side 19 near the seal plate fitting section 18 of the inner direction member 1. These lips 16a and 16b are formed as a part of elastic member 16 which becomes the 2nd seal plate 12 from the elastomer by which vulcanization adhesion was carried out. Side lip 16a inclines so that a tip may extend to the tip side of standing board section 11b, and radial lip 16b inclines so that a tip may extend to the method of the inside of bearing. Standing board section 12b of the 2nd seal plate 12 is made easy [ heavy-gage-izing of an elastic member 16 ] while it is crooked S characters thru/or in the shape of Z character so that the end face section may be located to the bearing inside rather than a point, and the rigidity of the seal plate 12 is raised by this.

[0017] It is made to confront each other with few [ body 12a of the 2nd seal plate 12 and the tip of standing board section 11b of the 1st seal plate 11 ] direction clearances of a path, and the labyrinth seal 17 consists of the clearance. The tip of the body of the point side of standing board section 11b of the 1st seal plate 11 and the 2nd seal plate 12 is covered in the tip cover sections 14a and 16d which become a part of elastic members 14 and 16 respectively, and, specifically, the above-mentioned labyrinth seal 17 is formed in the clearance for these tip cover section 14a and 16d. in addition, these tip cover sections 14a and 16d -- both -- you may omit -- moreover, either -- only one of the two may be omitted.

[0018] As for the 1st seal plate 11, the steel plate (SUS430 system of JIS etc.) of the magnetic substance, such as a ferromagnetic, for example, the stainless steel plates of a ferrite system, the rolled plate by which rustproofing was carried out are used. The stainless steel plates (SUS304 system etc.) of the austenite whose 2nd seal plate 12 is a steel plate, for example, non-magnetic material, the rolled plate by which rustproofing was carried out are used. For

example, the 1st seal plate 11 is used as the stainless steel plate of a ferrite system, and it is good also considering the 2nd seal plate 12 as an austenite stainless steel plate.

[0019] According to the bearing for wheels of this configuration, about the internal and external member 1 and the seal between two, it is obtained by the slide contact of each seal lips 16a and 16b prepared in the 2nd seal plate 12, and the labyrinth seal 17 which consists of standing face to face against body 12a of the 2nd seal plate 12 in few [ the tip of standing board section 11b of the 1st seal plate 11 ] direction clearances of a path. Since radial lip 16b \*\*\*\*\*s to the outer-diameter side near the seal plate fitting section of the way member 1 while it is rotation flank material, even if water permeates from the fitting section 18 of the 1st seal plate 11 and the method member 1 of inside, permeation into bearing is prevented in the slide contact section of radial lip 16b. Therefore, grease does not deteriorate in infiltration inflow and a bearing life improves. Moreover, since seal nature is secured by radial lip 16b in this way, the quality of the material of the 1st seal plate 11 is not restricted, but the flux density of the encoder grid by the elastic member 14 prepared in the standing board section 11b can be raised by using a proper ferromagnetic. Moreover, since joggle 20 was formed in the inner direction member 1 and fitting of the 1st seal plate 11 was carried out to it, migration to the method of the inside of bearing of the 1st seal plate 11 can be prevented, the installation location of the shaft orientations of the 1st seal plate 11 is regulated, and the suitable interference of side lip 16a is maintained. It is also avoided that the above-mentioned joggle 20 does not have the problem of degradation of the way member 1 on the strength and enlargement of the 1st seal plate 11 while following on formation of joggle 11, since it is the depth of thickness of body 11a of the seal plate 11, and it becomes it is shallow and inadequate engaging joggle 11.

[0020] Drawing 4 shows other operation gestalten of this invention. This operation gestalt is replaced with the configuration which made radial lip 16b incline in the operation gestalt shown in drawing 1 so that that tip may extend to the bearing inside, and this radial lip 16b is made to incline so that that tip may extend to a bearing outside. Other matters are the same as the operation gestalt of drawing 1 . Thus, when radial lip 16b is made to incline so that the tip may extend to a bearing outside, the permeation prevention effectiveness of the water from the outside of bearing to into bearing becomes high. Therefore, the water which permeated through side lip 16a or the fitting section 18 from the outside of bearing is certainly prevented to permeating into bearing exceeding radial lip 16b.

[0021] Drawing 5 shows the operation gestalt of further others of this invention. This operation gestalt is prepared in two places which left side lip 16a within and without the direction of a path in the operation gestalt shown in drawing 4 . Other matters are the same as the operation gestalt of drawing 4 . Side lip 16a mainly does so the permeation prevention function of the water from the outside of bearing to into bearing, it is preparing this side lip 16a within and without two, and the permeation prevention function of the water into bearing is raised.

[0022] Drawing 6 shows the operation gestalt of further others of this invention. In the operation gestalt of drawing 5 , annular periphery protruding line 14aa is formed in the outer-diameter side of tip cover section 14a of the 1st seal plate 11 in a bearing inside part, and this operation gestalt forms 16deca of annular inner circumference protruding lines in the bore side of 16d of tip cover sections of the 2nd seal plate 11. These periphery protruding line 14aa and 16deca of inner circumference protruding lines constitute the overall diameter section at the tip of the standing board section of the 1st seal plate 11, and the minimum diameter at the tip of a body of the 2nd seal plate 12. Periphery protruding line 14aa is located in the bearing inside rather than 16deca of inner circumference protruding lines, and is formed more greatly than the bore the outer diameter of whose is 16deca of inner circumference protruding lines. Let the opposed face of periphery protruding line 14aa and 16deca of inner circumference protruding lines be an inclined plane. Other matters are the same as the operation gestalt of drawing 6 .

[0023] In this configuration, the separation at the time of the non-assembly to the bearing of the 1st seal plate 11 and the 2nd seal plate 12 is prevented because periphery protruding line 14aa and 16deca of inner circumference protruding lines engage with shaft orientations. That is, with a basic configuration, since radial lip 16b of the 2nd seal plate 12 is not in slide contact with body 11a of the 1st seal plate 11, if it remains as it is, it is in the non-inclusion condition to bearing,



and the 1st and 2nd seal plates 11 and 12 is separated mutually. Therefore, the assembly operation to the time of conveyance or bearing becomes complicated, and a man day increases. On the other hand, as mentioned above, by preparing so that it may engage with shaft orientations, in a non-assembly condition, it is prevented that the 1st seal plate 11 and the 2nd seal plate 12 are separated, and it can deal with periphery protruding line 14aa and 16deca of inner circumference protruding lines as one component. Therefore, not to mention the time of conveyance, the number of erectors to bearing can be reduced and assembly etc. becomes easy. Moreover, by preparing such periphery protruding line 14aa and 16deca of inner circumference protruding lines, the cross-section configuration of the clearance which constitutes a labyrinth seal 17 turns into a letter of meandering, and seal effectiveness's improves. Since periphery protruding line 14aa and 16deca of inner circumference protruding lines are respectively formed by a part of elastic members 14 and 16, they are moving strongly the 1st and 2nd seal plate 11 and 12 to mutual to shaft orientations, and, and it incorporates or they can be carried out. [ dissociating at the time of compulsion ]

[0024] in addition -- although the tip cover sections 14a and 16d were formed in both 1st and 2nd seal plate 11 and 12 and periphery protruding line 14aa and 16deca of inner circumference protruding lines were prepared in these with the operation gestalt of drawing 6 -- these tip cover sections 14a and 16d -- either -- you may make it prepare only one of the two For example, as shown in drawing 7 , point 12aa of body 12a of the 2nd seal plate 12 should be crooked so that a tip side might be located in a bore side as an exposure, and may form in this periphery protruding line 14aa which can engage with shaft orientations at tip cover section 14a of the 1st seal plate 1. In this configuration, separation of the 1st [ in a non-assembly condition ] and 2nd seal plate 11 and 12 is prevented. Moreover, contrary to this, the standing board section tip of the 1st seal plate 11 may be made into an exposure, and 16deca ( drawing 6 ) of inner circumference protruding lines which engage with 16d of tip cover sections of body 12a of the 2nd seal plate 12 at the tip of standing board section 11b of the exposure may be prepared.

[0025] Drawing 8 shows the operation gestalt of further others of this invention. This operation gestalt is the radial lip 16b1 which inclined so that that tip might extend to the bearing inside as radial lip 16b prepared in an elastic member 16 in the operation gestalt shown in drawing 1 . In addition, radial lip 16b2 which inclined so that a tip might extend to a bearing outside It prepares. Thus, radial lip 16b2 to which a tip extends to a bearing outside When it prepares, the permeation prevention effectiveness of the water from the outside of bearing to into bearing becomes high. Radial lip 16b1 to which a tip extends to the bearing inside The prevention function of grease leakage out of bearing is achieved. Other matters are the same as the operation gestalt of drawing 1 .

[0026] Drawing 9 shows the operation gestalt of further others of this invention. This operation gestalt makes outer-diameter side 1b between orbital plane 1a of the inner direction member 1, and end panel a flat cylinder side in the operation gestalt shown in drawing 8 . That is, the joggle 20 in the example of drawing 8 is lost. The inner direction member 1 consists of an inner ring of spiral wound gasket. Other configurations are the same as the operation gestalt of drawing 8 . Thus, the cross section of the whole sealing device 5 is the radial lip 16b1 prolonged to the bearing inside which serves as a grease lip although it becomes small [ when outer-diameter side 1b of the inner direction member 1 is made into a flat side without joggle / the example of drawing 8 ]. A large slide contact tooth space can be taken. Therefore, the tooth space of the shaft orientations established in bearing can be miniaturized, and the degree of freedom of a design increases. If the tooth space of shaft orientations is made the same, since a bearing span can be made large, rigidity can be made high. In addition, also in each operation gestalt of drawing 1 , drawing 4 - drawing 7 , it is good considering the outer-diameter side between orbital plane 1a of the inner direction member 1, and end panel as well as the example of drawing 9 as a flat cylinder side. That is, joggle 20 is lost and it is good also considering the whole as the outer-diameter side 19 and a cylinder side of the diameter of said.

[0027] With each above-mentioned operation gestalt (each operation gestalt in which joggle 20 was formed to the outer-diameter side of the inner direction member 1) except the example of drawing 9 , as shown in drawing 10 , while becoming an inner ring of spiral wound gasket,

coincidence grinding of each part of the way member 1 is carried out on the grinding stone 30 of one. That is, coincidence grinding of minor diameter end-face 1c of the inner direction member 1, 1d of counter bore sections, orbital plane 1a, the outer-diameter side 19, and the joggle 20 is carried out with the grinding stone 30 of one. A grinding stone 30 is pushed in the direction of slant, as an arrow head shows to this drawing, and it performs an angular cut. Thus, coincidence grinding is carried out for processing the pitch dimension P of minor diameter end-face 1c and orbital plane 1a with a sufficient precision, while raising the coaxiality of each part of the inner direction member 1. This pitch dimension P is related to a bearing clearance.

[0028]

[Effect of the Invention] The 2nd seal plate writes the bearing for wheels of this invention as what has in one the side lip which \*\*\*\*s in the standing board section of the 1st seal plate, and the radial lip which \*\*\*\*s to the outer-diameter side near the seal plate fitting section of rotation flank material. An inflow into the bearing of the water which permeates from the fitting section of a seal plate can be prevented, improvement in a bearing life can be aimed at, and neither the omission of a seal plate nor the problem of migration arises, and reservation of flux density becomes easy.

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[Translation done.]

\* NOTICES \*

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is the fragmentary sectional view of the bearing for wheels concerning 1 operation gestalt of this invention.

[Drawing 2] It is the partial front view of the elastic member used as the encoder grid.

[Drawing 3] It is the sectional view of the example of the whole bearing for the said wheels.

[Drawing 4] It is the fragmentary sectional view of the bearing for wheels concerning other operation gestalten of this invention.

[Drawing 5] It is the fragmentary sectional view of the bearing for wheels concerning the operation gestalt of further others of this invention.

[Drawing 6] It is the fragmentary sectional view of the bearing for wheels concerning the operation gestalt of further others of this invention.

[Drawing 7] It is the fragmentary sectional view of the bearing for wheels concerning the operation gestalt of further others of this invention.

[Drawing 8] It is the fragmentary sectional view of the bearing for wheels concerning the operation gestalt of further others of this invention.

[Drawing 9] It is the fragmentary sectional view of the bearing for wheels concerning the operation gestalt of further others of this invention.

[Drawing 10] It is the explanatory view of the example of the inner-ring-of-spiral-wound-gasket processing approach.

[Drawing 11] It is the sectional view of the conventional example.

[Description of Notations]

- 1 -- Method member of inside
- 2 -- Method member of outside
- 3 -- Rolling element
- 5 -- Sealing device
- 6 -- Hub ring
- 11 -- 1st seal plate
- 12 -- 2nd seal plate
- 11a, 12a -- Body
- 11b, 12b -- Standing board section
- 14 -- Elastic member
- 14d -- Tip cover section
- 16a, 16b -- Lip section
- 16d -- Tip cover section
- 18 -- Fitting section
- 20 -- Joggle
- N, S -- Magnetic pole

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[Translation done.]